RESEARCH & ANALYTICAL LABORATORIES, INC.
Analytical/Process Consultations

07 April 2011

Compliant Service Branch
Public Water Supply Section
1634 Mail Service Center
Raleigh, NC 27699-1634
Attn: Christyn Fertenbaugh

Re: Corrosion Control Evaluation
PWSID No NC0241410
Brown Summit Middle School
Guilford County Schools

Dear Ms. Fertenbaugh:

Enclosed please find the Corrosion Control Treatment Study (CCT) for the above referenced facility. This groundwater system has exceeded the copper action level (i.e. 2.97 mg/l –October 2007). It is important to note that this water supply system has been in lead and copper compliance for the last four (4) years and should be eligible for reduced monitoring. It is suspected that inadequate flushing may have been the cause of the 2007 copper level exceedance. It is therefore recommended that the facility apply for reduced monitoring, carefully monitored (i.e. pH, copper, etc.), and no further action be taken until the lead or copper exceedance can be documented. These recommendations are based upon current and historical lead and copper data, water quality parameters, and the US EPA Revised Guidance Manual for Selecting Lead and Copper Control Strategies.

If you should have any questions concerning this report, or need additional information please so advise.

Sincerely,

James M. Cheshire
President/CEO
Research & Analytical Labs, Inc.

APR 19 2011

JMC/js

P.O. Box 473 • 106 Short Street • Kernersville, North Carolina 27284 • 336-996-2841 • Fax 336-996-0326
www.randalabs.com

MAIL TO: Compliance Branch
Public Water Supply Section
1634 Mail Service Center
Raleigh, North Carolina 27699-1634

Evaluation Form for Corrosion Control Treatment

A. PWS General Information Date: **04/05/2011**

1. PWS Name: Brown Summit Middle School
2. PWSID Number: NC0241410
3. Contact Person:

   Name: Mr. Larry Odell

   Mailing Address: Brown Summit Middle School
   3920 Naco Road
   Greensboro, North Carolina 27405

   Telephone: 336-370-2387

   Fax: 336-370-2398
4. Population served: 236
5. Person Responsible for preparing this form:

   Name: James M. Cheshire Signature: James M. Cheshire

   Telephone: 336-996-2841

. PWS Technical Information

1. Monitoring Results:
   Sampling Dates: From 07/01/07 To 12/31/07

   First-Flush Tap Monitoring Results:
   Lead:
   - Minimum concentration = <0.003 mg/L
   - Maximum concentration = <0.003 mg/L
   - 90th percentile = <0.003 mg/L

   Copper:
   - Minimum concentration = 1.24 mg/L
   - Maximum concentration = 4.05 mg/L
   - 90th percentile = 2.97 mg/L

   Point of Entry Monitoring Results (Averages): Water Quality Parameters (March 28 & 29 2011)

	Points of Entry				
	1	2	3	4	5
Lead Concentration in mg/L:	<RRL				
Copper Concentration in mg/L:	<RRL				
pH:	6.3				
Temperature, °C:	12				
Alkalinity, mg/L as $CaCO_3$:	20				
Calcium, mg/L as Ca:	2.84				
Conductivity, μmho/cm @ 25° C:	83				
Phosphate, mg/L as P:	<RRL				
Silicate, mg/L as SiO_2:	7.53				

*DIC = 9 mg C/L (saturation pH = 9.5)

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Water Quality Parameter Distribution System Monitoring Results:
Indicate whether field or laboratory measurement.

	Field	Lab
pH: minimum = 6.3 maximum = 6.5	X	
Alkalinity: minimum = 19 mg/L as $CaCO_3$ maximum = 20 mg/L as $CaCO_3$		X
Temperature: minimum = 13 °C maximum = 18 °C	X	
Calcium: minimum = 2.80 mg/L as Ca maximum = 2.87 mg/L as Ca		X
Conductivity: minimum = 83 μmho/cm @ 25° C maximum = 84 μmho/cm @ 25° C		X
Orthophosphate: (if phosphate based inhibitor is used) minimum = <RRL mg/L as P maximum = <RRL mg/L as P		X
Silica: (if silica based inhibitor is used) minimum = 7.49 mg/L as SiO_2 maximum = 7.52 mg/L as SiO_2		X

2. Existing Conditions:

Is treatment used? ☒ yes ☐ no

Identify water source(s):
Source No. 1 P01 (Well)
Source No. 2 _____
Source No. 3 _____

If treatment is used, is more than one source used at a time?

☐ yes ☒ no

Identify treatment processes used for each source:

Process	No. 1	No. 2	No. 3
Presedimentation			
Aeration			
Chemical mixing			
Flocculation			
Sedimentation			
Recarbonation			

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Identify treatment processes used for each source:

Process	No. 1	No. 2	No. 3
2nd Stage mixing			
2nd Stage flocculation			
2nd Stage sedimentation			
Filtration:			
Single medium			
Dual media			
Multi-media			
GAC cap on filters			
Disinfection:			
Chlorine	X		
Chlorine dioxide			
Chloramines			
Ozone			
Granular Activated Carbon			

List chemicals normally fed:

List chemicals sometimes fed:

3. Present Corrosion Control Treatment:
   None X
   Inhibitor _____
   Date initiated _____
   Present dose _____ mg/L
   Range in Residual in Distribution System:
   Maximum _____ mg/L Minimum _____ mg/L
   Brand name _____
   Type _____
   Has it been effective? Please comment on your experience.

   pH/alkalinity adjustment _____
   pH Target _____
   Alkalinity Target _____ mg/L $CaCO_3$

   Calcium adjustment _____
   Calcium Target _____ mg/L $CaCO_3$

4. Water Quality:

Complete the table below for typical untreated and treated water quality data. Copy this form as necessary for additional sources. Include data for each raw water source, if surface supplies are used, and finished water quality information (point of entry) from each treatment plant. If wells are used, water quality information from each well is acceptable but not necessary if several wells have similar data. For groundwater supplies, include a water quality summary for each wellfield or grouping of wells with similar quality.

Include available data for the following:

Parameters	Untreated Supply	Treated Water (point of entry)
pH, units	N/A	6.29, 6.35
Alkalinity, mg/L as $CaCO_3$	N/A	19.0, 21.8
Conductivity, μmho/cm @ 25° C	N/A	79.7, 86.5
Total dissolved solids, mg/L	--	--
Calcium, mg/L Ca	N/A	2.89, 2.78
Hardness, mg/L as $CaCO_3$	N/A	7.23*, 6.95*
Temperature, °C	N/A	10.3, 12.8
Chloride, mg/L	--	--
Sulfate, mg/L	--	--

*Calculated

5. Distribution System:

Does the distribution system contain lead service lines?

☐ yes ☒ no

If your system has lead service lines, mark below the approximate number of lines which can be located from existing records.

None _____ Some _____ Most _____ All _____

Is the distribution system flushed?

☐ None ☒ Some ☐ Most ☐ All

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6. Historical Information:

Is there a history of water quality complaints?

☐ yes ☒ no

If yes, then answer the following:

Are the complaints documented? ☐ yes ☐ no
Mark the general category of complaints below. Use:
1 for some complaints in this category
2 for several complains in this category
3 for severe complaints in this category
Categories of complaints:
Taste and odor _____
Color _____
Sediment _____
Other (specify) _____

Have there been any corrosion control studies?
☐ yes ☒ no

If yes, please indicate:
Date(s) of study From _____ To _____
Study conducted by PWS personnel? ☐ yes ☐ no
Brief results of study were _____

Study results attached? ☐ yes ☐ no

Were treatment changes recommended? ☐ yes ☐ no
If yes:
Were treatment changes implemented? ☐ yes ☐ no
Have corrosion characteristics of the treated water changed? ☐ yes ☐ no
If yes, how has change been measured?
General observation _____
Coupons _____
Frequency of complaints _____
Other _____ Briefly indicate below:
_____

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7. Treatment Constraints:

Optimal corrosion control treatment means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while insuring that the treatment does not cause the water system to violate any State or national primary drinking water regulations. Please indicate below which constraints to treatment will apply to your PWS. Use the following code:

1 Some constraint = Potential Impact but Extent is Uncertain.
2 Significant constraint = Other Treatment Modifications Required to Operate Option.
3 Severe constraint = Additional Capital Improvements Required to Operate Option.
4 Very severe constraint = Renders Option Infeasible.

Constraint	Treatments			
	pH/Alkalinity adjustment	Calcium adjustment	Inhibitor PO_4	Inhibitor Si
A. Regulatory	1	1	1	1
SOCs/IOCs	1	1	1	1
SWTR: Turbidity	1	1	1	1
Total Coliforms	1	1	1	1
SWTR/GWDR: Disinfection	1	1	1	1
Disinfection Byproducts	1	1	1	1
Lead and Copper Rule	1	1	1	1
Radionuclides	1	1	1	1
B. Functional	1	1	1	1
Taste & Odor	1	1	1	1
Wastewater Permit	1	1	1	1
Aesthetics	1	1	1	1
Operational	1	1	1	1
Other	1	1	1	1

8. Evaluation:

Briefly summarize the review of the corrosion control literature that pertains to your PWS. A report or summary can be appended to this form if preferred.

N/A

Were other similar facilities located which are experiencing successful corrosion control? N/A
☐ yes ☐ no

If yes, identify their corrosion control treatment method.
None _____
pH/Alkalinity adjustment _____
Calcium adjustment _____
Inhibitor _____
Phosphate based _____
Silica based _____

9. Recommendations:

The corrosion control treatment method installed or being proposed is:

pH/Alkalinity adjustment X
Target pH is 8.5 units
Target alkalinity is 80 mg/L as $CaCO_3$

Calcium adjustment X
Target calcium concentration is 40 mg/L Ca

Inhibitor N/A
Phosphate based _____
Brand name _____
Target dose _____ mg/L
Target residual _____ mg/L orthophosphate as P
Silica based _____
Brand name _____
Target dose _____ mg/L
Target residual _____ mg/L as SiO_2

Rationale for the proposed corrosion control treatment is:*

Discussed in the enclosed report

EPA Revised Guidance Manual for Selecting Lead & Copper Control Strategies

Briefly explained below

*Non-compliance data is based upon 2007 lead and copper monitoring data which had not been issued a NOV by DENR until now (2011). This system has been in consistent compliance for the last four (4) years and should be eligible for reduced monitoring. It is suspected that inadequate flushing of the distribution lines may have been the cause of the 2007 non-compliance. It is recommended that the system apply for reduced monitoring, carefully monitored (i.e. pH, etc.) and no further action be taken until a lead and copper exceedance can be documented.

List your proposed or operating guidelines:

Parameter	Operating Range
pH	7.0 – 8.5
Alkalinity	50 – 75 mg/L
Hardness	30 – 50 mg/L
_____	_____
_____	_____
_____	_____
_____	_____

Briefly explain why these guidelines were selected.

To improve the buffering capacity and pH stabilization of source water should raw water quality deteriorate.

10. Please provide any additional comments that will assist in determining optimal corrosion control treatment for your PWS.

    See explanation in section 9. Note that no further action is recommended other than applying for reduced monitoring.